H
0622/00-11
1926
c. 1

HEAT-STEM SAWFLY MENACE

Immediate Action is Necessary in Order to Prevent a General Infestation of Wheat Fields

By E. H. STRICKLAND, University of Alberta

For the past four years we have warned the farmers of Alberta to be on the watch for the first signs of Wheat-stem Sawfly damage around the edges of their wheat fields.

Inconsiderable as may appear to be the losses occasioned when a few fallen stems are seen, year after year, at the edges of the fields only, their presence is a certain precursor of severe losses in the near future unless every effort is made to eradicate the sawfly before it becomes thoroughly established in any district.

We regret to say that, despite our warnings, very little effort has been made by the majority of farmers in Alberta to forestall the inroads of this pest, with the result that, in three widely separated areas, the sawfly last year swept through entire fields causing, in many instances, as much as from 65% to 70% damage. This is but the beginning of a general infestation of every district in Alberta in which the sawfly is now known to be present, even in the smallest numbers, unless the farmers are prepared to take definite steps for its suppression.

While sawfly damage is confined to the edges of the wheat fields only, we believe that it is a comparatively simple matter for the farmers, by a united effort, to keep the pest permanently from invading entire fields. Once a general infestation has taken place, however, it is doubtful whether, in our life-time, it will be possible for us to bring it once more under subjection. Losses will, however, always be held to a minimum where all of the farmers employ the control measures that are described below.

AREA IN ALBERTA NOW KNOWN TO BE AFFECTED

We know, already, that the entire eastern half of Alberta is affected by the sawfly and that, unless immediate steps are taken for its control, every district in this area will, in a few years' time, be faced with the probability of heavy annual losses from this pest.

We cannot too urgently impress on every farmer in Alberta that it may be too late next year, in YOUR district, to avoid these losses entirely, and that you may then enter upon a new era of farming, similar to that which is now experienced in parts of neighbouring provinces. The only wheat that you can be certain of harvesting, in years of severe infestation, will be that which you cut while it is still green, or the sawfly will harvest it for you.

This year, throughout the greater part of the affected territory in Alberta, we believe that it is still possible to save the situation. Next year it may be too late. Can any farmer afford to neglect taking the necessary steps that will safeguard his future prosperity?

LIFE-HISTORY OF THE SAWFLY

A small wasp-like insect, the adult sawfly lays its eggs in the hollow straw of developing wheat-stems during June and July. From these eggs emerge small legless grubs which travel downward inside the straw, eating through the solid nodes, and leaving the straw filled with "sawdust." By about four days before the grain is ripening they have reached the bottom of the straw, though they remain inside it. They now turn round and crawl up to about ground level, where they cut off the straw from the inside. The attacked straw, with

its well-filled head, falls to the ground with the slightest breeze. The grub remains in the stub, packs its open end with sawdust, and spins a delicate silken cocoon around itself. Here it passes the winter and turns into a sawfly by about the end of the following May. Early in June this sawfly pushes the sawdust packing out of the open end of the stub, and is soon busily engaged in laying eggs in the next year's stand of wheat.

Where Do the Sawflies Come From?

Sawflies normally live in the flowering stems of grasses. For as long as they remain there they will not do us any serious damage. Also, they will never become very abundant because many other insects, their parasites, find the grubs while they are tunnelling down inside the grass-stems and lay eggs in them through the sides of these stems.

The grubs of these parasites live inside the sawfly grubs and eventually kill them. In the following spring, instead of a sawfly escaping from the stub of a severed grass-stem, parasites will emerge and they will attack the sawfly grubs of the next generation.

Transference to Wheat

For some reason that we cannot explain, a few sawflies occasionally discover that they can lay their eggs in wheat-stems just as satisfactorily as they can in those of grasses. It is these which attack the wheat around the edges of the fields. Fortunately for us most of the sawflies that develop in the wheat from their eggs fly back to grass in the following spring. For this reason the infestation of wheat may be confined to the edges of the wheat fields for several years, and no appreciable damage will be done during this period.

Cause of Increase in Wheat

The parasites, which kill off most of the sawfly grubs that are living in grass-stems, are unable to attack those grubs which are tunnelling in wheat-stems. Why is this? Is it that their instincts do not lead them to seek sawfly grubs in wheat-stems, or is it that they cannot reach the grubs inside the comparatively thick stems of wheat? We are unable to answer these questions in the present state of our knowledge. In North Dakota, where for many years sawflies have caused severe losses to wheat, some of the parasites are beginning to attack the sawfly grubs in wheat-stems, but in Alberta there is no sign of their doing so as yet. Here, for many years to come, we cannot look to the parasites to destroy any of the sawfly grubs in wheat, and even if they ever do manage to do so they will never kill all of them, any more than they now do in grasses.

At the present time, then, a very large number of the sawfly grubs that live in a wheat-stem will develop ultimately into egg-laying sawflies even though a large percentage of those living in grass-stems are killed by parasites.

As we have already stated, in the early years of sawfly transference to wheat most of the sawflies that escape from wheat-stubs in the spring still prefer to lay their eggs in grass-stems, and they leave the wheat fields in order to do so. A few only return to the edges of the wheat field for egg-laying.

This state of affairs cannot, however, last forever. The grubs from eggs that have been laid in wheat practically all survive, while most of those in grass-stems are killed by parasites. Every year that the grubs of the sawflies which have transferred to wheat are not destroyed the number of these wheat-inhabiting sawflies will steadily increase.

Sooner or later we shall find that the infestation is no longer confined to the edges of the fields, but that many of the sawflies which emerge from the wheat-stubs in the spring have flown through the entire fields and have infested them from end to end.

In this manner they entirely escape from their parasites, and there is little to prevent their steady increase in numbers until it may so happen that nearly every stem of wheat may be infested.

This condition has already been reached in three districts in Alberta. In how many more are our farmers going to allow similar conditions to develop?

Measures for Permanent Control of Sawflies

Since the parasites fail to destroy sawfly grubs in wheat it is essential that we, ourselves, perform this duty if we are to avoid a general infestation of our wheat fields.

The grub cuts off the straw in the fall in order to leave an avenue of escape for the sawfly, into which it will turn, in the spring. We can close this only by ploughing-in the stub in such a manner that the open end will be firmly pressed against the soil before the sawfly escapes.

With a mould-board plough, to which a "jointer" or skim-coulter is attached, plough-in all infested stubble to a depth of not less than six inches at any time between harvest and the end of the following May.

In order to obtain the best results this ploughing should be done in the fall. When this is impossible, spring ploughing (the earlier the better) is satisfactory, provided the stubble is well inverted and the soil is then PACKED with a heavy packer. Sawflies can escape through FOUR inches of LOOSE DRY earth, but are unable to do so if the soil has been packed while it is still moist.

So essential is it that this ploughing be done if we are to prevent the spread of the sawflies throughout entire fields, that the sawfly has now been included in The Pest Act of Alberta, and all farmers in those districts in which the sawfly is still confined to the edges of the wheat fields are REQUIRED, from now on, to plough-in all infested stubble around the edges of their fields. A single neglected field is liable to be the starting place of the wheat-inhabiting strain, which will rapidly spread from it throughout the entire district.

In this connection it should be noted that only such stubble as is actually infested (as is shown by fallen straws at harvest-time) need be ploughed. Since, in these lightly infested districts, this is usually confined at the edges of the fields to a depth of not more than two to three rods, this ploughing cannot prove to be a hardship to anyone, and it may be the means of saving the entire district from very heavy losses.

Since the sawfly amendment to The Pest Act was framed it is much to be regretted that the sawfly has already invaded entire fields in several districts. It is obvious that, in these areas, it will not always be practicable for the farmers to plough-in all of the infested stubble before the end of May. In these districts it is much to be feared that the complete control of this pest is no longer possible, but the severity of the infestation can be greatly reduced by consistent ploughing of as much infested stubble as is possible in the fall and early spring.

We would also recommend that around the edge of every stubble field which is known to contain sawfly grubs, and in which this ploughing cannot be done, about two drill-widths of wheat or oats be seeded early in the spring. This should be done whether the field is reserved for summer-fallow, or whether it is to be seeded to some immune crop such as flax or sunflowers, or, later in the season, to oats. Oats are immune from damage by sawflies, but they will lay their eggs freely in them if they are seeded sufficiently early in the season.

This strip of early seeded grain should attract the majority of the sawflies that escape from the infested stubs throughout the field during June, and they will lay their eggs there instead of in neighboring wheat fields. When wheat is employed for this purpose it MUST be cut for green-feed by the middle of July in order to destroy all of the grubs that it contains before they have burrowed down to the stubble that will be left after cutting.

The loyal co-operation of all the farmers in these districts may result in our being able so to reduce the numbers of the sawflies in grain fields that they will once more be confined to the edges of the fields only.

Under no conditions should wheat be stubbled-in on infested wheat stubble. In any district where this is done it is obviously impossible to prevent the establishment of the wheat-inhabiting strain.

Measures To Be Adopted Where Disk Ploughs are Employed

A serious difficulty must be faced in those districts in which the type of soil renders the use of a mould-board plough impracticable. Rarely can the soil be properly inverted with a disk plough.

In these districts it is advisable that the following methods be adopted:

Ordinary stubble-burning is useless for the destruction of sawfly grubs. They simply retire to the bottom of the stub as the fire passes over, and are unharmed. Experiments conducted during the past year at the Dominion Entomological Laboratory at Lethbridge indicate that if a few inches of straw be spread over infested stubble, and be then burned, the heat that is generated may be sufficiently great to destroy the majority of the grubs. In these districts, therefore, it is advisable to spread straw where necessary as thickly as is possible with a manure spreader, burn it, and then invert the soil as thoroughly as is possible with a disk plough.

We cannot say as yet how effective this straw-burning will prove to be when it is employed under different conditions of soil, moisture, etc. It is stated that it proved to be valueless in Manitoba under the conditions that existed there in fields in which this experiment was made in that province. Fall burning should, in any case, destroy the protecting plug of sawdust in many of the longer stubs. This might so expose the hibernating grubs that many of them would perish during the winter.

In the spring it is advisable that the wheat be seeded very shallowly for a couple of drill-widths around all fields, in order that the grubs of all sawflies which have entered this part of the field will be held as closely to the surface as is possible in the following fall.

It is hoped that we shall have the results of definite experiments along these lines to offer to the farmers of Alberta for their guidance before the autumn of 1927. The bulk of these experiments will be conducted under the direction of Mr. H. L. Seamans at the Dominion Entomological Laboratory at Lethbridge and we have a few similar experiments under way in the more northern portion of the infested territory.

Necessity of Co-operation

Co-operation on the part of all farmers is essential. The individual farmer, even in a district that is already severely infested, can greatly reduce losses in his own fields. The only hope of preventing the establishment of the wheat-infesting strain in any district depends, however, upon every owner of a field that is already infested, to however slight an extent, doing his duty in assuring that his field will not be the one in which this strain is allowed to become firmly established in his district.

The sawflies do not, as a rule, fly very great distances in the spring before laying their eggs in wheat or in grasses.

It should be borne in mind, however, by everyone, that every district which now suffers heavy losses from sawflies does so because, in the past, a few fields were lighty infesteld around their edges and no steps were taken for the destruction of the grubs. Had the edges of these fields been properly treated in every year that fallen straws were observed, we are convinced that these districts could never have become generally infested, as they are at present. We would urge, therefore, upon every farmer the advisability of assuring that, in so far as he is able, no wheat-inhabiting sawflies are allowed to increase their numbers undisturbed either in his own fields or in any others in his immediate vicinity.